



PATENT ABSTRACTS OF JAPAN

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(72) Inventor: **TOMARI HARUO**
SUGIZAKI YASUAKI
SATO TOSHIKI
YASUNAGA TATSUYA
SAI MASANORI
KAWADA KAZUHISA

**(54) HARD FILM EXCELLENT IN WEAR RESISTANCE
 AND OXIDATION RESISTANCE AND HIGH
 HARDNESS MEMBER**

(57) Abstract:

PURPOSE: To improve the wear resistance and oxidation resistance of a hard film by using a multiple compound of one or more kinds among the metallic elements of the group IVa, Va, and VIa elements of the periodic table, Si, and one or more elements among N, C, and B.

CONSTITUTION: The atomic ratio of Si to the total atomic content of one or more metallic elements selected from the group consisting of the group IVa, Va, and VIa

elements of the periodic table is regulated to 0.01-70%. When the atomic ratio of Si is less than 0.01%, the oxides in the hard film cannot be densified and oxidation resistance becomes insufficient. When the atomic ratio of Si exceeds 70%, the film is formed into amorphous state and hardness is reduced and, as a result, sufficient wear resistance cannot be obtained. A hard film can be formed on the surface of cutting tools, dies, etc., by a PVD method, an ion implantation method, etc., and the service lives of the tools and the dies can be prolonged.

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